3.3/21

$y = \frac{1}{5x-3}$ $\quad$ $f = 1$, $g = 5x-3$

$\frac{d}{dx}\left(\frac{f}{g}\right) = \frac{f'g - fg'}{g^2}$

$$\frac{dy}{dx} = \frac{(0)(5x-3) - (1)(5)}{(5x-3)^2}$$

$$= \frac{-5}{(5x-3)^2}$$

$(5x-3)^{-1}$

Wonder if powerrule?

$(-1)(5x-3)^{-2}$

Q?

X

3.3/27 $y=\left(\frac{3x+2}{\underset{f}{x}}\right)\left(\underset{g}{x^{-5}+1}\right)$ find $\left.\frac{dy}{dx}\right|_{x=1}$ $f'(1)$

$\frac{d}{dx}(f\cdot g)=f'g+fg'$

$$\frac{dy}{dx}=\left(\frac{d}{dx}\left(\frac{3x+2}{x}\right)\right)\left(x^{-5}+1\right)+\left(\frac{3x+2}{x}\right)\underset{g'}{\left(-5x^{-6}\right)}$$

$$?\ \frac{d}{dx}\left(\frac{3x+2}{x}\right)=\frac{(3)(x)-(3x+2)(1)}{(x)^2}$$

$$\frac{d}{dx}\left(\frac{f}{g}\right)=\frac{f'g-fg'}{g^2}$$

$$=\frac{3x-(3x+2)}{x^2}=-\frac{2}{x^2}$$

$$\frac{dy}{dx}=\left(-\frac{2}{x^2}\right)\left(x^{-5}+1\right)+\left(\frac{3x+2}{x}\right)\left(-5x^{-6}\right)$$

$$\left.\frac{dy}{dx}\right|_{x=1}=\left(-\frac{2}{1^2}\right)\left(1^{-5}+1\right)+\left(\frac{3(1)+2}{1}\right)\left(-5(1)^{-6}\right)$$

$$=(-2)(2)+(5)(-5)$$

$$-4+-25=-29$$

$$\frac{d}{dx}\left(\left(\frac{3x+2}{x}\right)\left(x^{-5}+1\right)\right)$$

$$\frac{3x+2}{x} = \frac{3x}{x} + \frac{2}{x} = 3 + \frac{2}{x}$$

$$\frac{d}{dx}\left(\left(3+2x^{-1}\right)\left(x^{-5}+1\right)\right)$$

$$\frac{d}{dx}(f \cdot g) = f'g + fg'$$

$$= \overset{f'}{\left(-2x^{-2}\right)}\overset{g}{\left(x^{-5}+1\right)} + \overset{f}{\left(3+2x^{-1}\right)}\overset{g'}{\left(-5x^{-6}\right)}$$

at $x=1$

$$(-2)(2) + (5)(-5)$$

$$\frac{d}{dx}\left(x^n\right) = nx^{n-1}$$

$$\frac{d}{dx}\left(af(x)\right) = a\frac{d}{dx}\left(f(x)\right)$$

$$\frac{d}{dx}\left(3x\right) = 3\frac{d}{dx}\left(x^1\right)$$

$$= 3\left(1x^0\right) = 3$$

$\frac{24}{17}$)

$$x = \frac{t^2+1}{3t} \qquad x = f(t)$$

$$\frac{dx}{dt} = \frac{d}{dt}\left(\frac{f}{g}\right) = \frac{f'g - fg'}{g^2}$$

$$\frac{dx}{dt} = \frac{\overset{f'}{(2t)}\overset{g}{(3t)} - \overset{f}{(t^2+1)}\overset{g'}{(3)}}{(3t)^2}$$

$$= \frac{6t^2 - (3t^2+3)}{9t^2} = \frac{3t^2-3}{9t^2} = \frac{3(t^2-1)}{3(3t^2)}$$

$$= \frac{t^2-1}{3t^2} = \frac{1}{3} - \frac{1}{3t^2}$$

$$\frac{t^2}{3t^2} - \frac{1}{3t^2}$$

$$x = \frac{t^2+1}{3t} = \frac{t^2}{3t} + \frac{1}{3t}$$

$$= \frac{t}{3} + \frac{1}{3t}$$

$$= \frac{1}{3}t + \frac{1}{3}\left(\frac{1}{t}\right) = \frac{1}{3}t + \frac{1}{3}t^{-1}$$

$$\frac{dx}{dt} = \frac{1}{3} + \frac{1}{3}\left(\frac{-1}{t^2}\right)$$

$$(-1)t^{-2}$$

3.3/17)

$$y = \underbrace{(x^3 + 7x^2 - 8)}_{f}\underbrace{(2x^{-3} + x^{-4})}_{g}$$

$$\frac{dy}{dx} = \overbrace{(3x^2 + 14x)}^{f'}\overbrace{(2x^{-3} + x^{-4})}^{g} + \overbrace{(x^3 + 7x^2 - 8)}^{f}\overbrace{(-6x^{-4} - 4x^{-5})}^{g'}$$

3.3/17) $y = (x^3 + 7x^2 - 8)(2x^{-3} + x^{-4})$

$\qquad\qquad\qquad\quad f \qquad\qquad\qquad g$

$$\frac{dy}{dx} = f'g + fg'$$

$$= \overbrace{\left(\frac{d}{dx}(x^3 + 7x^2 - 8)\right)}^{f'}\overbrace{\left(2x^{-3} + x^{-4}\right)}^{g} + \overbrace{\left(x^3 + 7x^2 - 8\right)}^{f}\overbrace{\left(\frac{d}{dx}(2x^{-3} + x^{-4})\right)}^{g'}$$

$$(3x^2 + 14x)(2x^{-3} + x^{-4}) + (x^3 + 7x^2 - 8)(-6x^{-4} - 4x^{-5})$$

27) $y = \left(\frac{3x+2}{x}\right)\left(x^{-5}+1\right)$

find $\left.\frac{dy}{dx}\right|_{x=1}$

$f'(1)$

$\underbrace{(fg)' = f'g + fg'}$

$$\frac{dy}{dx} = \left(\frac{d}{dx}\left(\frac{3x+2}{x}\right)\right)\left(x^{-5}+1\right) + \left(\frac{3x+2}{x}\right)\left(-5x^{-6}\right)$$

$$\frac{d}{dx}\left(\frac{3x+2}{x}\right) = \frac{(3)(x) - (3x+2)(1)}{(x)^2}$$

$3x - (3x+2)$

$3x - 3x - 2$

$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$

$$\frac{dy}{dx} = \left(\frac{-2}{x^2}\right)\left(x^{-5}+1\right) + \left(\frac{3x+2}{x}\right)\left(-5x^{-6}\right)$$

$$\left.\frac{dy}{dx}\right|_{x=1} = \left(\frac{-2}{1^2}\right)\left(1^{-5}+1\right) + \left(\frac{3(1)+2}{(1)}\right)\left(-5(1)^{-6}\right)$$

$$= (-2)(2) + (5)(-5)$$

$$= -29$$

d(product)

$(d(\ ))(\ \ ) + (\ \ )(\ \ )$

Quotient

$$\frac{d}{dx}\left(\frac{3x+2}{x}\right) = \frac{d}{dx}\left(\frac{3x}{x}+\frac{2}{x}\right)$$

$$= \frac{d}{dx}\left(3+\frac{2}{x}\right) = \frac{d}{dx}\left(3+2x^{-1}\right)$$

28) $y = (2x^7 - x^2)\left(\frac{x-1}{x+1}\right)$

$$\frac{dy}{dx} = (14x^6 - 2x)\left(\frac{x-1}{x+1}\right) + (2x^7 - x^2)\left(\frac{d}{dx}\left(\frac{x-1}{x+1}\right)\right)$$

$$\frac{d}{dx}\left(\frac{x-1}{x+1}\right) = \frac{d}{dx}\left(\frac{(x+1)-2}{x+1}\right) = \frac{d}{dx}\left(\frac{x+1}{x+1} - \frac{2}{x+1}\right) = \frac{d}{dx}\left(1 - \frac{2}{x+1}\right)$$

$$\frac{d}{dx}\left(\frac{x-1}{x+1}\right) = \frac{(1)(x+1) - (x-1)(1)}{(x+1)^2} = \frac{(x+1)-(x-1)}{(x+1)^2} = \frac{2}{(x+1)^2}$$

$$\frac{dy}{dx} = (14x^6 - 2x)\left(\frac{x-1}{x+1}\right) + (2x^7 - x^2)\left(\frac{2}{(x+1)^2}\right)$$

$$\left.\frac{dy}{dx}\right|_{x=1} = (12)(0) + (1)\left(\frac{1}{2}\right) = \frac{1}{2}$$

29) $f(x) = x^3 - 3x + 1$ $\qquad f'(1)$

$f'(x) = 3x^2 - 3$; $f'(1) = 3(1)^2 - 3 = 0$

est $f'(1)$ by

$f(x) = x^3 - 3x + 1$ $\qquad \dfrac{f(x) - f(1)}{x - 1}$ = slope between $(1, f(1))$ and $(x, f(x))$

x	$\frac{f(x)-f(1)}{x-1}$
2	$\frac{3 - -1}{1} = 4$
0	$\frac{1 - -1}{-1} = -2$
1.5	$\frac{-.125 - -1}{.5} = \frac{.875}{.5} = 1.75$